

POSITION PAPER

Recommendations for Infant/Toddler

Water Safety Education

Written by Broward County Drowning Prevention Task Force, Aquatics Committee
Approved by Broward County Drowning Prevention Task Force Members July 7, 2010

INTRODUCTION

This position statement addresses the Broward County Drowning Prevention Task Force's explanation of "water safety education" and how the methods we support can aid in the cognitive, physical and emotional development of the child. The benefits of getting children in the water early are far more than just learning to swim. This statement in no way endorses one agency, organization or particular method. What the Drowning Prevention Task Force is supporting is the education and awareness to pediatricians, parents and aquatic professionals the benefits of water safety education to very young children and their development as they grow.

BACKGROUND

Drowning is the leading cause of unintentional injury deaths for children 1-4 years, the second leading cause of unintentional injury deaths for children 1-14 years, and is the fifth leading cause of unintentional injury deaths for all ages in the United States (CDC, WISQARS, 2005)

The American Academy of Pediatrics suggests "new evidence shows that children ages 1 to 4 may be less likely to drown if they have had formal swimming instruction. The studies are small, and they don't define what type of lessons work best, so the AAP is not recommending mandatory swim lessons for all children ages 1 to 4 at this time. Instead, the new guidance recommends that parents should decide whether to enroll an individual child in swim lessons based on the child's frequency of exposure to water, emotional development, physical abilities, and certain health concerns related to pool water infections and pool chemicals. The AAP does not recommend formal water safety programs for children younger than 1 year of age. The water-survival skills programs for infants may make compelling videos for the Internet, but no scientific study has yet demonstrated these classes are effective, the policy states."

With this new information the Drowning Prevention Task Force developed a "Water SMART Babies" booklet that addresses this new statement from the AAP. It is specifically targeting pediatricians and parents and educating them about water safety and the resources parents need for keeping their children safe in and around the water. The Task Force in partnership with the Broward County Health Department, Joe DiMaggio Children's Hospital, Safe Kids and the Pediatric Society of Broward County has distributed the booklets to pediatrician's offices, clinics and hospitals throughout Broward County.

With the AAP new stance on water safety lessons and the distribution of the Water SMART Babies booklet the Drowning Prevention Task Forces projects that parents are more likely to enroll the children into some form of water safety/swim class. It is imperative that parents, pediatricians and aquatic professionals be aware of the benefits to the child as they move and learn in the water.

STATEMENT

The Task Force stresses that no one agency, organization or swim school method is being endorsed or supported. The intent of this statement is to support the research that shows how beneficial children learning water safety and learn to swim skills will contribute to a child's overall development cognitively, physically and emotionally if done right. And it may also save their lives!

Building Skills upon Skills

Before a child can deal with the water environment in a useful way, sensations from the body must be organized. The child can adapt to a situation only if he knows what the situation is. That is why an aquatic instructor should show (visual) the student; tell (auditory) him and guide (proprioceptive) him, before she expects him to act in an adaptive manner. Then she must walk the child through the skill, without submersion, using gentle guidance, manipulating his every move before expecting him to perform the skill under water. Patient preparation is critical to security and confidence, and helps to promote joy and enthusiasm for water safety lessons (Whitehead 2008, 2010).

The lesson plans should be ordered in a step-by-step plan of development wherein one skill is built upon another in proper order. The skills are practiced over and over so that the child learns each skill to the automatic level. When a child repeats movements his nervous system creates new neuro pathways. The impulses flowing through his neurons activate nerve fibers to grow branches and twigs reaching out to other neurons. These new nerve pathways lay down intricate neuro networks that direct a child's higher learning. For example when a child learns to swim a short distance to the steps and climb out, this is repeated for many lessons until he can perform the activity without thinking about it. Then the instructor should add varying conditions such as swimming a short distance to the side of the pool and climbing out, to make sure he can still perform the skill at the accurate level before she moves him up to the next level (Whitehead).

When a child does not improve his performance of a certain skill, the instructor should move the child back down the vertical scale to discover the links he has missed. Then they will practice skills in the previous level until the child is confident to move on. This allows the child's nervous system to organize the sensations and direct information to the proper nerve pathways and muscles needed to perform the skill accurately. Through repetition and practice, the child will appear to have suddenly learned the skill when in reality the brain has been organizing it all along (Whitehead).

By practicing with a child regularly, the child will come to respect, to enjoy and to be comfortable in the water. The most important ingredient for success is firm but gentle assurance that the child can perform all of which he is capable. This will guarantee a steady progress that will delight the child and his family. (Whitehead)
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Moving and Learning

Recent neurological research links movement to learning and memory. If neurologists now agree that active movement is scientifically linked to intellectual development, how early should movement training begin?

Babies are born with most of their neurons, billions. But they have few interconnections (synapses) between the neurons. As a baby moves and interacts with his world, the impulses flowing through his neurons stimulate the cell fibers to grow more branches and twigs reaching out to other neurons. When neurons are stimulated through movement, they develop interconnections (synapses). The more interconnections, the more capable the child is of learning (Whitehead).

Interaction or communication between the neurons is necessary for learning to take place. Neuroscientists at University of California at Irvine discovered that active movement activates the release of BDNF, a brain-derived neurotrophic factor (Kinoshita 1999). BDNF is a protein that acts on certain neurons in the brain; it supports the growth, function, and survival of these neurons and synapses in the hippocampus, cerebral cortex, and the basal forebrain. These are areas of vital learning, memory, and higher reasoning (Whitehead).

Every time a synapse is used, it becomes stronger and easier to send messages in the future. Every time a movement is repeated, less energy is used to repeat it in the future. As an infant repeats movements, the brain groups those movements together in a neural memory. A newborn has very few memories stored in his synapses. As he moves and interacts with his world, his nervous system accumulates more neural memories (Ayers 1991).

A child has neural memories for everything he can do. These sensory/motor memories create an internal picture of the body. This body image is stored in the child's nervous system. The child's brain refers to this internal picture to plan his movements. The more accurate the internal body image, the better able a child is to navigate unfamiliar movements (Ayers 1991). By giving a child many varied sensory experiences like the active movement in swimming, his movement experiences become more plentiful and diverse, resulting in a more developed internal body picture. However without this information, the child would not know where the parts of his body are or how to spontaneously move from one place to another without conscious planning.

The Research on Stress and the Brain

When a child is introduced to the water and is forced to repeat one skill over and over again without the advantage of the building blocks learned in a progression of skills the results could be harmful. In an effort to teach a child water safety skills in a short period of time, some methods submerge a very beginning student repeatedly to get him to rotate onto his back to breathe and float alone. The basic breathing and motor skills that allow his nervous system to organize the sequential steps necessary to direct his swim and float have been omitted. This places the inexperienced swimmer in what he perceives to be a "life or death situation". If practiced repeatedly this places a child in the chronic stressful situation of "saving his life" every time he swims which can produce high levels of cortisol in the brain. This could be detrimental to the child's emotional and cognitive development that may not manifest until later in childhood.

Stress and the Brain

There is a great deal of evidence concerning the effects of sustained or prolonged stress on the size and memory capacity of the hippocampus. The hippocampus is an important area of the brain involved in learning and memory that is particularly sensitive to stress (McEwen 1992, Spolsky, 1996). Studies have shown that high levels of glucocorticoids (cortisol in humans) released during stress were associated with damage to neurons in the CA3 region of the hippocampus and a loss of neurons and dendritic branching (Uno 1989, Spolsky 1990, Woolley 1990). Stress also results in deficits in new learning that are secondary to damage to the hippocampus (Luine, 1994, Bodnoff 1995). Exciting research has shown that the hippocampus has the capacity to regenerate neurons and that stress inhibits neurogenesis in the hippocampus (Bremner 2005).

Another area of the brain affected by stress is the medial prefrontal cortex (decreased blood flow to the Brodmann's area 25 or subcallosal gyrus) in PTSD victims (Bremmer). The Medial prefrontal cortex interfaces with cognitive and emotional systems of the brain. Within this structure emotions and the meaning of things are created.

When the stress factor is repetitive or persistent, the body keeps secreting the stress hormones and their blood levels remain at a high level. Raised cortisol levels for prolonged periods can damp down the immune system and impair memory. It can also affect blood pressure and fats in the blood increasing the chance of stroke or heart attack. Manifestations of physiological damages of the brain from stress could be chronic headache, mood swings, anxiety, depression, sleeplessness, difficulty concentrating and disturbances in verbal declarative memory etc (Bremmer).

Conclusions

The Broward County Drowning Prevention Task Force supports the gentle, nurturing lessons that are taught based on building skills up on skills until the movement is learned based on the research and available data on the subject. Water safety lessons are in no way a guarantee that a child will not drown. Many layers of protection are needed, including water safety lessons/learn to swim and that is still no guarantee. However the more layers a family has the less likely a fatal or non fatal drowning incident will occur.

The Drowning Prevention Task Force advocates many layers of protection in which water safety lessons are just one of many. These include active adult supervision; preventing unauthorized entry with four-sided isolation fencing, gates and latches; safety covers; door alarms; learning to swim; learning CPR and rescue techniques, and having an emergency action plan. Each additional layer or strategy beyond the first could be the one that saves a life. Use as many as possible at all times.

A point of view from aquatic experts:

Kids can move in the water and respond to certain cues with a conditioned response which is one of the things that I think separates some survival skills from learned and voluntary swimming ability. Yes there is a tremendous difference in my view, of a water survival program and a learn to swim progression. Both have degrees of intensity as to how aggressively the skills are introduced and taught during classes and this is my biggest concern. But first the differences.... I believe that in most survival type programs the objective is to learn a specific safety skill such as rolling over to a back float position which can later transition into a swim - float-swim type movement. The ability to get back to the side is another example of a safety skill that can be readily learned (Johnny Johnson 2010).

There are many philosophies and methodologies as to how to teach children to swim but most involve an ongoing progression that continues until the child learns the specific swimming stroke that is emphasized. In our program, we spend a great deal of time developing a foundation of breath control, balance control and basic understanding of movement. Much like the process that a child goes through in learning to walk, there are definite building blocks of abilities that must come together for a skill with voluntary control to be learned (Johnson).

My concerns: Consider that 90% of brain development takes place in the first three years of life. The sensory integration process that takes place is greatly affected by the amount of stress that is involved in the experiences that the child has during this memory processing period. The emotional well being of a child is greatly enhanced in a loving, fun and positively reinforced environment while conversely fear based or stressful memory processing can compromise a child's later ability for self esteem and confidence, trust, and to cope with situations (Johnson)

We are talking about a practice of throwing children in the pool to simulate drowning and watching to see if the child can survive. It is like showing a child a busy Broward street putting him IN the road and watching to see if he or she makes it to the curb. Parents have some how been desensitized to the cruelty and absurdity of this (Karen King 2010).

Lana Whitehead clearly tells us" the stressful situation of "saving his life" every time he swims can produce high levels of cortisol in the brain. This could be detrimental to the child's emotional and cognitive development that may not manifest until later in childhood" (King).

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